

Scientific Computing (Psychology 9040a)

Fall, 2020

Instructor Information

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How to navigate this course

Due to the COVID-19 pandemic, unfortunately **the course will not have any in-person component**. The course will be run online/remote.

Each week, the course is focused on a different topic. The topics are listed in the table below, under the **Calendar** heading. Start by clicking on the name of the topic. There you will find a list of tasks to complete under the **Prep** heading.

The course content will be filled out as we progress through the term. I will make announcements in OWL when new material is posted to this website and/or when changes/corrections to existing material are made. You will receive the announcements in your Western email account so be sure to check that regularly.

There is **one assignment each week**, which you will find under the **Assignment** heading, and also listed in the table below. Assignments are to be submitted on OWL (<https://owl.uwo.ca>). Assignments will be graded on a 4-point scale: [0,1,2,3] where 3 corresponds to 100%, 2 corresponds to 85%, 1 corresponds to 75% and 0 corresponds to 0%. Your final grade in the course will be determined by the grades on the weekly assignments.

We will have two opportunities each week to get together synchronously as a class (tutorials) or one-to-one (office hours), over Zoom. **These are optional**, you do not have to attend.

- Tutorials (optional) will be **Tuesdays from 1:00 pm to 2:00 pm**, on Zoom
- Office hours (optional) will be **Thursdays from 1:00 pm to 2:00 pm**, on Zoom

For **tutorials** the Zoom meeting ID can be found in [OWL](#) on the main welcome page. The first tutorial will be on Tuesday September 15th at 1:00 pm.

For **office hours** you **must** sign up for a specific time slot using the “Sign-up” tool in [OWL](#). The Zoom meeting ID for office hours will be shown within [OWL](#).

We have a **TA for the course**, Chad Buckland (cbucklan@uwo.ca). Chad is your first point of contact for help. I am here as well if you need additional guidance.

There are **Discussion Forums in OWL**, use them to post questions about weekly material, and/or Assignments. Our TA Chad will monitor them and respond to questions. I will monitor them as well. Use the Discussion Forums, as you do, they will build up and represent a useful resource for everyone.

This is a graduate course, so progressing through the material will depend on you taking the initiative to complete the readings, play with the practice coding exercises, and complete the assignments on time. You should consider the course materials as a map—pointers to resources to help you learn to program in Python to solve problems—and me as your tour guide, pointing you in the directions of interesting things to go and learn about. Have fun!

—Paul

Goals

The goal of this one-semester graduate seminar is to provide you with skills in scientific computing—tools and techniques that you can use in your own research. You will learn to program in Python, which is a high-level programming language with many libraries that provide a rich ecosystem for scientific computing.

The course is designed to achieve three primary goals:

1. You will learn to program in a high-level language
2. You will learn to think computationally and algorithmically
3. You will be better prepared to pick up more complex skills to suit your own research goals

Textbook

[Python for Data Analysis](#) (2nd Edition) by Wes McKinney (O'Reilly 2018) will be our textbook for the course.

We will also use material from [Think Python \(2nd Ed.\)](#) by Allen B. Downey (Green Tea Press 2015).

Software

We will be using the [Anaconda Python \(v3\)](#) distribution.

You can choose your own code editor. Some possibilities are: [Sublime Text](#), which is available for MacOS, Windows, and GNU/Linux, and costs a bit of money, and [Visual Studio Code](#) and [Atom](#), both of which are free. All three have Python extensions: [Anaconda for Sublime Text](#), [Python Visual Studio Code](#), and [Atom IDE-python package](#). Of course you can also use [Emacs](#) or [Vim](#) if you are in a retro mood.

Topics

In the first part of the course, which will likely occupy a large part of the semester, you will learn how to write computer programs to solve problems and analyze data. We will make use of several online problem sets such as [Project Euler](#) and [Advent of Code](#).

Here is a sketch of some of the topics we will likely cover in the course:

Fundamental Topics

- What is a computer program?
- Digital representation of data
- Basic data types, operators and expressions
- Control flow
- Complex data types
- Functions
- Input and output
- Scientific computing using NumPy
- Debugging & profiling
- Graphical displays of data

At the end of the term we will spend some time with some sample datasets, so that we can practice producing analyses and graphics.

Prerequisites

There are no prerequisites. Students will have varying levels of experience with programming. If you have never programmed before then you will have more to learn than students who have previous experience.

Methods of Evaluation

- 100% weekly programming assignments.

There will be one programming assignment each week. There will be no tests, quizzes or exams.

STATEMENT ON ACADEMIC OFFENCES

Students are responsible for understanding the nature and avoiding the occurrence of plagiarism and other scholastic offences. Plagiarism and cheating are considered very serious offences because they undermine the integrity of research and education. Actions constituting a scholastic offence are described at the following link: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

As of Sept. 1, 2009, the Department of Psychology will take the following steps to detect scholastic offences. All multiple-choice tests and exams will be checked for similarities in the pattern of responses using reliable software, and records will be made of student seating locations in all tests and exams. All written assignments will be submitted to TurnItIn, a service designed to detect and deter plagiarism by comparing written material to over 5 billion pages of content located on the Internet or in TurnItIn's databases. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between Western and Turnitin.com (<http://www.turnitin.com>).

Computer-marked multiple-choice tests and/or exams will be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

In classes that involve the use of a personal response system (PRS), data collected using the PRS will only be used in a manner consistent to that described in this outline. It is the instructor's responsibility to make every effort to ensure that data remain confidential. However, students should be aware that as with all forms of electronic communication, privacy is not guaranteed. Your PRS login credentials are for your sole use only. Students attempting to use another student's credentials to submit data through the PRS may be subject to academic misconduct proceedings.

Possible penalties for a scholastic offence include failure of the assignment/exam, failure of the course, suspension from the University, and expulsion from the University.

POLICY ON ACCOMMODATION FOR ILLNESS OR OTHER ABSENCES

Western's policy on Accommodation for Medical Illness can be found at: http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=1&Command=showCategory&SelectedCalendar=Live&ArchiveID=#Page_12

The full policy for consideration for absences can be accessed at: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf

If you experience an extenuating circumstance (e.g., illness, injury) sufficiently significant to temporarily make you unable to meet academic requirements, you may request accommodation through the following routes:

- i. Submitting a Self-Reported Absence form (for circumstances that are expected to resolve within 48 hours);
- ii. For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner in order to be eligible for Academic Consideration;
- iii. For non-medical absences, submitting appropriate documentation (e.g., obituary, police report, accident report, court order, etc.) to Academic Counselling in their Faculty of registration in order to be eligible for academic consideration. Students are encouraged to contact their Academic Counselling unit to clarify what documentation is appropriate.

Students must see the Academic Counsellor and submit all required documentation in order to be approved for certain accommodation. The self-reported absence form must be submitted before the exam/coursework deadline in order to be valid. It **may NOT** be used for absences **longer than 48 hours; coursework/tests/exams/etc., worth more than 30% of the final grade; or exams scheduled in the December or April final-exam periods:** http://counselling.ssc.uwo.ca/procedures/medical_accommodation.html

Students seeking academic consideration:

- are advised to consider carefully the implications of postponing tests or midterm exams or delaying handing in work;
- are encouraged to make appropriate decisions based on their specific circumstances, recognizing that minor ailments (upset stomach) or upsets (argument with a friend) are not normally an appropriate basis for a self-reported absence;
- **must communicate with their instructors no later than 24 hours** after the end of the period covered by either the self-reported absence or SMC, or immediately upon their return following a documented absence

Contingency Plan for Return to Lockdown

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

STATEMENTS CONCERNING ONLINE ETIQUETTE

In courses involving online interactions, the Psychology Department expects students to honour the following rules of etiquette:

- please “arrive” to class on time
- please use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- please ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material
- to minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- In classes larger than 30 participants please turn off your video camera for the entire class unless you are invited to speak
- In classes of 30 students or fewer, where video chat procedures are being used, please be prepared to turn your video camera off at the instructor’s request if the internet connection becomes unstable
- Unless invited by your instructor, do **not** share your screen in the meeting

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- If you wish to speak, use the “raise hand” function and wait for the instructor to acknowledge you before beginning your comment or question.
- Please remember to unmute your microphone and turn on your video camera before speaking.
- Self-identify when speaking.
- Please remember to mute your mic and turn off your video camera after speaking (unless directed otherwise).

General considerations of “netiquette”:

- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
- Be professional and scholarly in all online postings. Use proper grammar and spelling. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

OTHER INFORMATION

Office of the Registrar: <http://registrar.uwo.ca>

Student Development Services: www.sdc.uwo.ca

Please see the Psychology Undergraduate web site for information on the following:

http://psychology.uwo.ca/undergraduate/student_responsibilities/index.html

- Policy on Cheating and Academic Misconduct
- Procedures for Appealing Academic Evaluations
- Policy on Attendance
- Policy Regarding Makeup Exams and Extensions of Deadlines
- Policy for Assignments
- Short Absences
- Extended Absences
- Documentation
- Academic Concerns
- 2020-2021 Calendar References

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